



NASA Langley's Growth of Carbon Nanotubes

Templated growth process provides uniform-sized carbon nanotubes

NASA Langley researchers have developed a novel method for making carbon nanotubes that are very uniform in size. A template is used to guide the carbon nanotube growth so that all nanotubes are uniform in size. The carbon nanotubes can be used as grown, uniformly dispersed and aligned within the template or isolated from the template for use as carbon nanotubes. The solution-based process uses sugar as a carbon source, does not require vacuum, and is thus simple and low-cost in nature.

Benefits

- Provides low-cost method for growing carbon nanotubes of uniform length and diameter.
- Carbon nanotubes are uniformly aligned within the growth template, providing opportunity to use as carbon nanotube composite with unique electrical properties.
- Template and precursor starter materials are inexpensive, and standard furnace ovens can achieve temperatures required to complete fabrication of the templated carbon nanotubes. Vacuum equipment is not required.
- Carbon nanotubes are free of metallic catalyst impurities.

partnership opportunity





Applications

Uniform carbon nanotubes have potential use across many applications, including:

- Electron field emission sources
- Flat panel, field-emission displays
- Use as functional additive for creating high strength, lightweight, multifunctional composite structures
- Advanced electronic devices, interconnects, and packaging materials

The Technology

The invention involves the synthesis of carbon nanotube/silica nanocomposites via a templating method in order to control the carbon nanotube diameter. A mesoporous silica or alumina supports are used as a template for the aligned growth of the carbon nanotubes. Sucrose is deposited in each pore of the template. Upon the application of heat, the single-wall carbon nanotubes grow from the carbon in the sucrose precursor to produce carbon nanotubes of the desired diameter embedded in the silica template. Removing the silica template can isolate the carbon nanotubes. The technology is covered under U.S. patent 7,169,374.

For More Information

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

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